REPORT
ON

IMPROVEMENT OF CALABAZAS CREEK

ONE-HALF MILE SOUTH OF STEVENS CREEK ROAD TO EL CAMINO REAL.

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PALO ALTO, CALIF.   SANTA CLARA, CALIF.

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George S. Nolte
Civil Engineering - Land Surveying
Palo Alto, Calif. Santa Clara, Calif.

April, 1956

PROPERTY OF SANTA CLARA VALLEY
WATER DISTRICT
5750 Almaden Expressway
San Jose, California 95118

April 2, 1956

G. S. Nolte
Civil Engineer
310 University Avenue
Palo Alto, California

Santa Clara County
Flood Control & Water
Conservation District
1st and Rosa Street,
SAN JOSE, California.

Gentlemen:

Pursuant to the contract covering improvement of Calabazas Creek from one-half mile south of Stevens Creek Road to El Camino Real, a report with drawings is herewith submitted for your acceptance and approval.

This report covers recommended improvements of this channel to a degree deemed adequate by this office for ultimate development of the basin drained by Calabazas Creek between the limits stated.

Yours truly,

Geo. Nolte

G. S. Nolte
Civil Engineer

INTRODUCTION

Those lands to the South of El Camino Real may be generally regarded as the residential area for the people who are coming in ever increasing numbers to staff the new and expanding industries and the resultant commercial enterprises in the Santa Clara Valley. Present trends indicate that the valley will become one of the nation's great centers for light industry.

In view of the increasing development and resultant increasing property values, the present need for flood control work of magnitude is urgent. Developments in the lower portions of the valley have rendered it no longer possible to permit occasional flooding in these areas as has been done in the recent past. Not only does the great increase in paved and roofed areas aggravate the flood problem, but the flood plains of the streams which have served to pond the greater floods are no longer available.

The number of natural drainage channels carrying off flood flows from the valley floor is not sufficient to provide a reserve of proper capacity for any period beyond the very immediate future. Such existing channels must be regarded as a precious public property and must be augmented by artificial channels to protect developments within their basins and to protect costly damage to these existing channels due to scour from excessive velocities occurring at bank full stages.

The lessons of the floods of December 1955 should still be fresh in the minds of every resident of the valley who experienced them.

SCOPE OF REPORT

Improvement works recommended in this report are intended to protect lands bordering the Calabazas Channel from a point one-half mile upstream from the Stevens Creek Bridge to El Camino Real. Works have been proportioned to accommodate flood flows from a storm of fifty years recurrence frequency.

Accompanying drawings set forth requirements for permanent channel improvements which may be regarded as the minimum program which should be undertaken.

Costs are based upon the unit prices furnished as indices by the office of the Santa Clara County Engineer.

As nearly as possible, the locations for the various structures have been coordinated with presently anticipated future street patterns of the Cities of Santa Clara and Sunnyvale.

BASIC CONSIDERATIONS

The rate of growth of the Santa Clara valley at the present time is between 2500 and 3000 persons per month. These people are, for the most part, being attracted to this area by the employment possibilities in the new industries and commercial enterprises. The new residential areas resulting from this growth are served by storm drainage systems having their main outfalls into existing stream channels.

Water which used to pond on orchard lands or be retarded by vegetable growth is, to an increasing degree, being rapidly intercepted by drainage collection systems and swiftly carried off to the streams. A greater percentage of rainfall is being drained off laterally from the surface of the land rather than being allowed to percolate into the soil. Storm runoffs which occurred only infrequently when the land use was primarily agricultural will occur with ever increasing frequency as the imperviousness of the area increases and the flow velocity is increased by drainage collection systems.

Different communities of the Santa Clara Valley have used different design storms for the proportioning of drainage works. This has resulted from differing land values and uses, ability to finance drainage works, and the often varying concepts of engineers regarding application of hydrological data and theory. This report assumes the majority of the new tracts will size their drainage collection systems to accommodate the runoff resulting from a storm of three year recurrence frequency.

Improvements to the channel should be planned with the following factors in mind:

1. Provide a waterway of adequate capacity to handle the design storm, and to do so without creating excessive velocities of flow.

2. Plan the final alignment to fit the future development pattern of the area, and also to cause a minimum of property severance along the route of the stream.

3. Provide a means of ready access to any portion of the channel so that emergency crews can take care of any exigency.

4. Design all improvements so as to require minimum maintenance.

5. Regulate channel depths so as to adequately drain the most remote areas of the basin by means of future storm drains.

BASIC DATA

The following is a list of the principal sources of data upon which this report is based:

(1) Maps:

The calculation of contributary areas has been based upon the quadrangle maps of the U.S. Geological Survey, and the current storm drainage map of the City of Sunnyvale. The quadrangle maps included those for West San Jose, Mountain View, Cupertino and Milpitas, and are plotted to a scale of one inch to two thousand feet. Future points of discharge for storm waters originating in Sunnyvale were taken from the City's map.

(2) Aerial Photographs:

The engineer has produced aerial photographs of the course of the present Calabazas Channel for the entire length of this project. These photographs are to a scale of one-hundred feet to the inch, and include an average width of about three-hundred feet on each side of the present stream. Strip maps shown in this report are based upon carefully matched mosaics made up from the photographs.

(3) Field Engineering Work:

The engineer has taken cross sections of the channel and enough of the bordering land to enable the calculation of quantities of earth work, and to determine the necessary proportions of the future structures. Measurements of existing structures were made to determine their adequacy for future flood flows. At locations of future structures, enough topographic data has been taken to serve as the basis for final design of those structures.

(4) Rainfall and Runoff Data:

The computation of runoff quantities has been based upon the rainfall intensity tables and curves currently used by the Santa Clara County Engineers Office. During the floods of December 1955, high water marks were left by the receding flood wave that enabled the calculation of approximate peak flows in certain reaches of the Calabazas Channel. Results of these calculations agree reasonably well with the engineer's calculations based upon the Santa Clara County rainfall intensity curves.

(5) Right-of-way

The recorded maps of the various residential tracts bordering the Calabazas have been used to define the rights-of-way presently dedicated. These areas are shown on the drawings by shading.

CRITERIA FOR CHANNEL IMPROVEMENTS

The following criteria have been selected by the engineer as best applicable to the improvement of the Calabazas Channel. The design as shown on the drawings represents the most austere program that should be followed.

RIGHT-OF-WAY

It is highly desirable to provide access to the channel at any point from roadways on each side of the creek. With the minimum channel sections chosen by the engineer this would necessitate an approximate 80 foot width of right-of-way to be dedicated to the County. The area between the edge of the channel and the outside of the right-of-way would be used as a road way and also a dumping area for excess material which will result from construction. In calculating the cost to the County of acquiring this right-of-way, it is assumed that all right-of-way in addition to that which is presently dedicated will have to be purchased. It is recognized that this is not strictly true because of the large number of subdivisions which are planned along the route of the stream.

BRIDGES AND DROP STRUCTURES

Due to excessive slope in the present channel, velocities as high as twelve feet per second are attained during flood flows at the present time. The floods of December 1955 caused a great deal of scouring damage to the upper channel with resultant silting in the lower portions of the valley. In order to prevent this in the future, it is proposed that the grade of the channel be reduced so as to reduce the flood velocities. This may best be accomplished by the construction of drop structures to lower the grade of the stream. The drawings indicate the locations of the drop structures. At existing roadway crossings, or at the site of roadway crossings that are proposed for the future, it is recommended that a drop structure be incorporated into each crossing structure. For the sake of the economy and easy maintenance, it is recommended that these drop structures, where they occur at future street crossings, be so designed as to form the base for future bridges or culverts.

CHANNEL SECTIONS

The minimum channel sections shown on the drawings have been designed to carry the flow from a ten year frequency storm with about two feet minimum freeboard. Flowing full these channels could carry greater than the fifty year frequency storm runoff.

PROPOSED CALABAZAS DAM

The proposed dam on Calabazas Creek near Pierce and Mt. Eden Roads will, if constructed, exert a modifying influence upon the peak flood flows caused by a majority of the anticipated storms. This structure's primary purpose is for water conservation, however, and if used for such may not always greatly diminish flows anticipated by the engineer. For this reason it is recommended that the channel sections shown on the drawings be adopted rather than employing smaller sections which may be called upon to carry volumes of water beyond their capacity.

VEGETATIVE LININGS

No channel linings are planned for this contract other than sacked concrete rip-rap downstream from drop structures. The use of vegetative coverings should be more fully explored and perhaps used in addition to drop structures rather than as a substitute for these structures. It is highly questionable that any of the recommended canal lining plants can be successfully established along the channel without considerable expense and effort toward cultivation and irrigation. Before any large scale program is undertaken to create vegetative linings along the channel, it is recommended that test sections be established along limited reaches of the channel and various types of vegetating linings be planted.

The Following Text Refers To Improvements Shown on Sheet No. 1 Of The Drawings

The beginning of this contract is designated as point No. 1 on Sheet No. 1 of the drawings. This is also the point at which the 30 inch storm drain for Casa Del Sol Subdivision enters the creek. It is recommended that this storm drain be incorporated into the downstream walls of the drop structure to be constructed at this point. Such a structure will enable regrading of the channel bed to reduce velocities of flow. The present stream channel from point No. 1, to a point approximately 1350 feet downstream from point No. 1 is of adequate capacity to carry anticipated flood flows. Improvement of this reach of channel will consist mainly of the construction of a drop structure at point No. 1, and the regrading of the channel bed. Some clearing of brush from the waterway will also be required.

A sharp reverse bend occurs at about 1350 feet downstream from point No. 1, and it is recommended that this portion of the channel be realigned along a straight tangent to eliminate this bend. At the upstream end of this realigned portion it is recommended that an additional drop structure be installed to aid in reducing velocities of flow. That portion of the channel for about 600 feet upstream from the Stevens Creek Road Bridge will have to be cleared of brush and deepened to accommodate anticipated flood flows.

The existing bridge at Stevens Creek Road is of adequate capacity to carry flood flows resulting from a 10 year frequency storm, but the structure should be supplemented with a 72" reinforced concrete pipe in order to pass the 50 year storm. It is recommended that a drop be added at the downstream end of this structure. This need consist only of a water cushion and a section of rip-rap bank protection. The present structure has a concrete floor which will enable use of the structure as a drop. About 350 feet downstream from the Stevens Creek Bridge, another reinforced concrete drop structure should be installed in the stream channel. Other than the regrading of the stream bed downstream from this structure no additional improvement of the channel is required. At the downstream end of this reach of channel another drop structure should be installed. The minimum channel section indicated on Sheet No. 1 of the drawings will accommodate the ten year flood flow with approximately an 8 foot depth of flow. Fifty year storm runoff will be accommodated with approximately a 10 foot depth of flow.

The Following Text Refers to Improvements Shown On Sheet No. 2 Of The Drawings

This section of channel which occurs midway between Stevens Creek Road and Homestead Road will require considerable realignment as shown on the drawing. Where curved realignment is necessary it is recommended that nothing less than a 500 foot radius be used, and greater length radii where possible. The alignment shown is the most economical as regards damage to orchard lands bordering the stream. The drop structures indicated between match line 3 and match line 4 do not occur at proposed street crossings but may be varied in location to suit the best field conditions. At the westerly border of Westwood Oaks Subdivision, approximately 900 feet of right-of-way eighty feet in width has been dedicated to the City of Santa Clara. Remainder of the right-of-way shown on this sheet must be purchased. If permission can be obtained from the adjoining ownerships, excess materials removed from the channel may be dumped in what is presently a flood plain of the stream between match line 2 and match line 3. It is anticipated that enough such area exists that no excess material will have to be dumped in the right-of-way limits.

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The Following Text Refers To Improvements Shown On Sheet No. 3 Of The Drawings

The drop structure 600 feet upstream from Homestead Road occurs at the head of what is presently the narrowest reach of channel within these contract limits. Considerable widening of the stream must be undertaken. The existing culvert structure at Homestead Road consists of a double barreled culvert of rectangular cross section and having a central dividing wall. Even in years of moderate flow, this structure has caused considerable trouble for the surrounding properties. Brush impinges upon the center wall and backs the water up over the banks of the creek. That more damage due to flooding did not occur at this site during the December 1955 floods was due to efforts of neighboring property owners toward keeping the entrance clear of the brush. It is recommended that this present structure be demolished, and in its place a single barreled culvert of sufficient waterway to clear flood water flows and floating debris be constructed. This new structure should have a concrete floor and a water cushion at the downstream end so that it may also act as a drop structure. A strip of land approximately 400 feet wide was flooded during the December 1955 flood on what is now the site of the Laurom Park Subdivision. The existing channel in this area is badly choked with brush and should be cleared during the deepening operation required for the regrading of the channel floor. From Homestead Road to point No. 2 as indicated on drawing No. 3, a right-of-way approximately 1400 feet in length and 80 feet wide has been dedicated to the City of Santa Clara. This right-of-way is indicated on the drawing by shading.

It is recommended that a drop structure be constructed at point No. 2 which is also the point of outfall of the 21 inch reinforced concrete storm sewer serving Laurom Park Tract. This will provide a means for supporting the 21 inch sewer where it enters the channel. The pipe can be incorporated in the wall of the water cushion portion of the structure. From Homestead Road to Lawrence Station Road no realignment of the creek is necessary. Other than structures the improvement work will consist of deepening the channel as required by regrading and clearing the waterway of brush. At point No. 2 the width of the channel bottom will change from 12 feet on the upstream portion to 13 feet on the downstream portion. At Lawrence Station Road the present reinforced concrete culvert is of inadequate capacity to carrying anticipated flood flows, and must therefore be replaced. It is recommended that a similar structure be built at Lawrence Station Road as was built at Homestead Road, that is a bridge crossing with a clear span sufficiently large to pass the flood flows and floating debris and a drop structure at the downstream end of the bridge.

At a point approximately 400 feet downstream from Lawrence Station Road there is an abandoned farm bridge having timber piers. This structure provides an obstacle for floating debris, and should be demolished.

Between Lawrence Station Road and the future crossing at Benton Street a forty foot strip of right-of-way has already been dedicated to the City of Santa Clara.

At Benton Street the City of Santa Clara plans a future bridge crossing on the Calabazas Channel. It is recommended that a drop structure be incorporated with the new bridge as before described. This drop structure could be so designed as to form the foundation for the bridge structure.

The Following Text Refers to Improvements Shown On Sheet No. 4 Of The Drawings

At approximately 1800 feet downstream from the Lawrence Station Bridge, a realignment on a curve with a five-hundred foot radius is necessary to eliminate the present short radius bend occurring at the Southwest corner of the Pomeroy School playground. During the December 1955 floods the creek over-topped its banks at this point and flooded the school ground and orchard. Near the downstream end of this curve it is proposed that a drop structure be built to reduce the velocity of flow. Downstream from this structure the channel section will widen from a bottom width of 13 feet to a bottom width of 14 feet. At approximately the northwest corner of the Pomeroy School playground another realignment along a five-hundred foot radius curve is necessary to eliminate the short radius bend occurring near the present west end of Granada Street. This short radius bend was also a scene of flooding due to over-topping during the December 1955 storms.

An existing 40 foot wide right-of-way from near the west end of Granada Street to Pomeroy Avenue has been dedicated to the City of Santa Clara. The limits of this right-of-way are designated by shading on drawing No. 4.

The present culvert structure at Pomeroy Avenue is of insufficient capacity to pass anticipated flood flows, and in addition the structure is too narrow to accommodate the present load of traffic along Pomeroy Avenue. It is proposed that a structure similar to that used at Homestead and Lawrence Station Roads be built here, having a drop structure at the downstream end of the bridge.

Beginning at Pomeroy Avenue the right-of-way increases to a total width of 150 feet. This is in line with the future plans of the City of Santa Clara for the extension of Calabazas Boulevard. This Boulevard will consist of at least four traffic lanes separated by Calabazas Channel. The width of the right-of-way is the same as that presently dedicated downstream from El Camino Real.

A new structure is proposed for the crossing at El Camino Real, both to provide additional flood flow capacity, and to provide a better approach to El Camino Real from future Calabazas Boulevard. It would be highly desirable to include that portion of the realignment between points 4 and 5 in work to be performed under the contract from El Camino Real to the retarding basin. This would enable the optimum approach of Calabazas Boulevard to El Camino Real to be constructed in the near future.

COSTS OF CHANNEL IMPROVEMENTS

Channel Excavation	84,~~691~~ 700 c.y.	@	0.40	50	$ 33,876	42,3
Structural Excavation	2,550 c.y.	@	3.60		9,180	10,
Reinforced Concrete	1,025 c.y.	@	74.00	75	75,850	77,
Demolition of Existing Structures				L.S.	2,700	3,
Clearing 10 Acres		@	300.00		3,000	5,
~~72" R.C.P.~~ Improvement Stevens Rd Bridge	~~130 ln.ft.~~	~~@~~	~~25.00~~	L.S.	3,250	35
~~Right-Of-Way~~	~~32 Acres~~		~~2,000.00~~	5,000	~~64,000~~	700,
TOTAL CONSTRUCTION COST					191,856	190,
ENGINEERING & CONTINGENCIES @ 15%				30%,	28,780	42,
					$ 220,636	182,
Right of way	32 acres	@	5000			160,
				~~CALL~~	~~$ 221,000~~	343,

NOTE: The above costs are based upon the unit prices furnished as indices by the Office of the Santa Clara County Engineer.

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